

Improved performance of a single-phase to three-phase converter using a 4-switch quasi Z-source inverter

Abstract

This paper proposes an improved space vector pulse width modulation (PWM) control method for a 4-switch single-phase to three-phase converter using a Quasi Z-source (QZs) network that can be utilized in induction motor drive applications. Without using any extra filtering circuits, this method can work well to reject the effect of DC-link voltage ripple on the inverter output voltage, which can be accomplished by either power supply or voltage variations in the 4-switch structure. This closed-loop control strategy recognizes and senses any unbalanced voltage that occur across two split capacitors and by applying the changes in the vector's activation interval time, the three-phase output voltage can be balanced. In traditional methods, the DC-link voltage without ripple is often achieved at the expense of larger DC-link capacitors that lead to a bulky and heavy DC-link filter with slow response and increase in cost. The simulation results of the proposed control method demonstrate its efficiency and the potential of the structure to be further developed.